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ABSTRACT

An evaluation project conducted at the Dona Ana County Occupational Education Branch of New Mexico State University was designed to compare the effectiveness of Century 21 Shorthand with Gregg Shorthand. Two classes of shorthand students were set up as experimental groups: thirty-five students in Century 21 and twenty-six students in Gregg. Their performance was assessed for four semesters based on the following performance measures: dictation speed, scores on theory tests, scores on brief form tests, and overall average grades. In addition, survival rates of students with different ethnic and language backgrounds were studied. After the first semester comparison results indicated no statistical difference in the performance of the two groups. Century 21 was found to have some slight advantage in holding power (perhaps because of its novelty). Additional data was gathered from each student utilizing the following forms: biographical information, Career Education Description Questionnaire, background information questionnaire, background and study habits questionnaire, American College Testing (ACT) scores, and teachers' summary of performance (grade book). The socio-economic measures seemed the best indicators of success, but it was too early to tell if the Career Education Description Questionnaire could predict some measure of success. (The questionnaires and the proposal for the evaluation are included in the appendix. Results of the second, third, and final semester evaluations are presented in separate documents.) (BM)

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An Evaluation of the Project:
lot Course in Century 21 Shorthand

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Introduction

An evaluation of the first semester performance of students in Century 21 and in Gregg Shorthand at the DACOEB branch of NMSU was performed September 1975-December 1975. The intended approach is outlined in an appendix (Proposal for Evaluation, August 20, 1975). The approach as outlined was followed fairly closely. Some variables: Pop Quiz average, attendance and sex were dropped as not being appropriate measures of performance; also, the analysis of drop-out rate as a function of ACT, etc. was not handled in any predictive manner (that is t-tests or regressions) because there was no performance data for the drop outs. Rather, the summary of students dropping out and continuing was used in a summary table indicating that Century 21 apparently had a better holding power for foreign language speaking students (Spanish) than did Gregg. That summary follows this introduction.

Data was gathered from each student enrolled in the two sections utilizing the following forms (see appendix):

Biographical Information
Career Education Description Questionnaire
Background Information Questionnaire
Background and Study Habits Questionnaire
ACT scores as recorded in NMSU files
Teachers summary of performance (Grade Book)

In addition, the examinations taken by each student were scanned and additional information concerning common words missed in dictation tests of theory and speed forms is being compiled. This data, after suitable tabulation, should provide a guide to the instructors as to what common errors most students (in either section) make as well as unique difficulties of the foreign language speakers. This analysis will be completed later in the spring.

The sections which follow describe the results of the various analyses performed in the statistical evaluation of the Gregg-Century 21 comparisons.

At this stage, we cannot say that Gregg or Century 21 have any distinct advantages. The first thought is that they are apparently equally successful, with Century 21 having some slight advantage in holding power (perhaps because of its novelty) while one method or the other has some slight advantages when various performance measures are examined. From an overall view, however, there is no difference (statistically) in the performance of the two groups. The tried and true socio-economic measures seem to be the best indicators of success while the new measures introduced by the still developing Career Education Description Questionnaire might improve predictability of success. It is too early to tell.

These classes met four times per week (3 class periods plus one laboratory period) each 50 minutes in length. The comparisons reported here are for an instructor teaching Century 21 for the first time versus an experienced Gregg teacher.

Holding Power

One way of judging the success of Century 21 as compared with Gregg is to compare the proportion of successful students (in various categories) in each of the two shorthand courses. The following proportions of successful students (where success = a grade of C- or better at the end of the course) were found for the 35 Century 21 students and 26 Gregg students who started the two sections.

When scoring on the basis of satisfactory performance as a function of total number starting, the following is revealed:

Century 21 is more successful than Gregg in producing a larger proportion of satisfactories:

Century 21	Gregg
52%	44%

Among the minorities (non-anglos), Century 21 results in more success than Gregg:

Century 21	Gregg
53%	38%

Among the students who speak a foreign language at home:

Century 21	Gregg
42%	38%

For anglos, there is very little difference between the two groups:

Century 21	Gregg
50%	55%

When one views the proportion of successful students by considering only those that have received a failure after trying to pass (rather than non-success by withdrawing or failing to come to class), Century 21 is still better than Gregg among the various sub-divisions (except anglos):

Century 21	Gregg
70%	58%

For students who speak a foreign language at home:

Century 21	Gregg
71%	64%

For anglos, very little difference:

Century 21	Gregg
83%	80%

None of these percentage comparisons differ in any significant way ($P<.05$), but the differences as a group do indicate that the overall superiority of Century 21 for all measures considered together is significant at the $P<.05$ level (chi-squared test).

Conclusion

Century 21 results in more success than does Gregg for minority students however grouped. For anglo students about the same proportion of success holds for Century 21 as for Gregg, with the proportion of successful anglos being equal to or better than that of the minorities.

Analysis of Variance

Analyses of variance of the two groups:

Analyses of Gregg versus Century 21 were performed utilizing three ACT scores (in turn) as a second variable. The students were grouped as either low or high in ACT performance based on the following ranges of scores:

English ACT	(low = 1-13, high = 15+)
Math ACT	(low = 1-11, high = 12+)
Overall ACT	(low = 1-12, high = 13+)

The students were divided into categories on a third variable: Speaking a foreign language at home or not.

The measurements used as performance variables in these analyses were scores (expressed as percent of maximum attainable) achieved in the following shorthand measures:

Dictation speed	(average of 3 highest test scores at 60, 70, 80 wpm)
Theory tests	(average of 4 tests)
Brief form tests	(average of 4 tests)
Final average	(average of all of the above)

The experimental designs for the Analyses of Variance were as follows (Number of subjects is shown in each cell):

		ACT English 1-13 Low	ACT English 15+ High
Foreign Language	Century 21	8	5
	Gregg	8	5
English Only	Century 21	6	16
	Gregg	7	6

35 Century 21, 26 Gregg
26 Foreign Language
35 English Only
29 Low ACT, 32 High ACT
N = 61 (Total)

		ACT Mathematics 1-11 Low	ACT Mathematics 12+ High
Foreign Language	Century 21	7	6
	Gregg	9	4
English Only	Century 21	5	17
	Gregg	8	5

35 Century 21, 26 Gregg
26 Foreign Language
35 English Only
29 Low ACT, 32 High ACT
N = 61 (Total)

		ACT Overall 1-12 Low	ACT Overall 13+ High
Foreign Language	Century 21	7	6
	Gregg	9	4
English Only	Century 21	5	17
	Gregg	8	5

35 Century 21, 26 Gregg
26 Foreign Language
35 English Only
29 Low ACT, 32 High ACT
N = 61 (Total)

With the cut points for low and high ACT as shown on the three ACT scores, the total number of low and high ACT performers was the same for each ANOVA design as were the total numbers of Gregg-Century 21 students and the Foreign Language or English only speakers. The design is not quite balanced, being overbalanced by the large number of English only students in the High ACT performance category. There is an imbalance also in the fact that there are approximately half again as many Century 21 students in the sample as there are Gregg students. Again, the same condition exists for the comparison between students with English only and the students who speak a foreign language. However, the cut points chosen in the ACT scores yielded approximately equal numbers of High and Low ACT

performers (the latter variable was the only one truly manipulatable by the experimenter. The other splits were natural characteristics of the class sampled).

With these experimental designs the ANOVA's were performed. The only variables that showed a significant difference ($P<.05$) were the Dictation and Final Average performance for the High ACT Math and ACT Overall groups versus the Low ACT Math and ACT Overall groups. All other performance measures including all interactions were not significant. A typical result of the analyses of variance is shown in the following summary ANOVA table:

Table I

Measure - DICTATION (% of Maximum)

	Source of Variability	df	Mean Sq.	F-Ratio	Sign.
A.	ACT Math Score (low, high)	1	1649.37	4.58	$P<.05$
B.	Foreign Language or No	1	172.83	0.48	n.s.
C.	Gregg or Century 21	1	215.28	0.60	n.s.
AB.	Interaction	1	264.31	0.73	n.s.
AC.	Interaction	1	71.74	0.20	n.s.
BC.	Interaction	1	250.43	0.69	n.s.
ABC.	Interaction	1	3.31	0.01	n.s.
Error		53	360.42		
Total Variability		60	2987.68		

*$p>.05$: $F\geq 4.03$ (df = 1,53)

A list of the F-ratio for the ACT variable (low versus high) follows:

Table II

Performance Measure	F-Ratio	Sign. Level
English ACT Scores (low = 1-13, high = 15+)		
Dictation Speed	.04	n.s.
Theory Tests	.18	n.s.
Brief Forms	.02	n.s.
Overall Average	.02	n.s.
Mathematics ACT scores (low = 1-11, high = 12+)		
Dictation Speed	4.58	P<.05
Theory Tests	3.49	n.s.
Brief Forms	3.45	n.s.
Overall Average	4.06	P<.05
Overall ACT scores (low = 1-12, high = 13+)		
Dictation Speed	4.59	P<.05
Theory Tests	3.46	n.s.
Brief Forms	3.44	n.s.
Overall Average	4.05	P<.05

The results for the mathematics and overall ACT groupings are virtually identical, the same students were involved in each cell division and the Overall ACT scores are heavily affected by the Math ACT performance. In any case, either the Math ACT measure or the Overall ACT measure seems to be a good predictor of performance in dictation performance in either Gregg or Century 21. This part of the analysis seems to indicate no difference in these performance measures between Gregg or Century 21 Shorthand. A comparison of Gregg student performance with Century 21 student performance on these and other measures (t-test comparisons) may reveal some differences.

Comparisons of Means for the Two Groups

Various background and attitude measures were gathered on the individuals comprising the Gregg and the Century 21 Shorthand groups. The group means and standard deviations for each of these measures for each group were computed and tabulated. The results are in the following tables, (Tables III and IV).

Table III

t-test of
BACKGROUND VARIABLES

VARIABLE	GREGG STUDENTS MEAN (N=23)	GREGG STUDENTS SD (N=23)	CENTURY STUDENTS MEAN (N=32)	CENTURY STUDENTS SD (N=32)	t-value	sign Level[a]
1. Hometown Population	2.00	1.21	2.38	1.41	-1.03	
2. Family Income	1.39	1.59	1.66	1.72	-0.58	
3. Father's Education	2.91	1.78	2.94	2.08	-0.05	
4. Mother's Education	2.70	1.72	3.69	2.24	-1.78	.10
5. High School GPA	3.87	0.69	3.56	1.32	1.02	
6. High School Eng. GPA	2.85	0.64	2.69	0.57	0.97	
7. Semester GPA (expected)	2.34	0.16	2.52	0.42	-1.75	.10
8. Age	20.04	4.01	21.84	7.83	-1.01	
9. Foreign Language usage	1.61	0.58	1.44	0.56	1.09	
10. Shorthand W.P.M. (HS)	14.13	26.83	18.75	28.71	-0.60	
11. Typing speed	39.78	27.24	41.59	27.38	-0.24	
12. Office Machines Operated	2.30	2.05	2.25	1.76	0.11	
13. ACT overall	12.48	4.60	14.81	5.44	-1.67	.10
14. ACT English	13.04	5.37	16.13	6.82	-1.80	.10
15. ACT Math	10.09	6.60	11.78	6.18	-0.97	
16. ACT Social Studies	10.70	5.50	13.34	6.71	-1.55	.10
17. ACT Natural Sciences	15.61	5.87	17.66	5.05	-1.39	
18. Hrs. Studied/wk.	8.83	1.80	9.44	3.05	-0.86	
19. English course Enrolled	0.22	0.42	0.19	0.40	0.27	

- = favors Century [a]df = 53

Table IV

t-test of
ATTITUDE AND PERFORMANCE VARIABLES

VARIABLE	GREGG STUDENTS MEAN (N=23)	SD	CENTURY STUDENTS MEAN (N=32)	SD	t-value	sign Level[a]
CAREER OUTLOOK SUBSCORES (MID POINT=2.50)						
20. Self developer	2.70	0.31	2.80	0.35	-1.10	
21. Utilitarian	2.37	0.25	2.42	0.40	-0.55	
22. Preparator	2.91	0.25	3.00	0.46	-0.86	
23. Procrastinator	2.80	0.44	2.71	0.49	0.73	
24. Interactive	2.59	0.32	2.58	0.41	0.13	
25. Planner	2.59	0.32	2.56	0.26	0.31	
26. Risk-taker	3.01	0.32	2.94	0.33	0.77	
27. Socializer	2.60	0.35	2.62	0.51	-0.16	
28. Temporalist	2.91	0.34	2.88	0.35	0.34	
29. Rationalist	2.60	0.42	2.62	0.37	-0.19	
30. Advancer	3.00	0.35	2.89	0.40	1.08	
31. Socially Aware	3.27	0.41	3.12	0.39	1.33	
32. Independent	2.30	0.59	2.39	0.38	-0.66	
33. Regionalist	2.74	0.43	2.66	0.40	0.73	
SHORTHAND PERFORMANCE						
34. Dictation	56.65*	19.56	56.03*	19.51	0.12	
35. Theory Tests	45.48	36.40	46.59	37.57	-0.11	
36. Brief Forms	61.74	44.55	61.25	45.63	0.04	
37. Final Average	54.65	31.66	54.72	32.53	-0.01	

- = favors Century

[a]df = 53, none are significant or nearly so.

*Average dictation speeds are indicated as a percent of maximum attainable (80 wpm). True average speeds (in words per minute with 95% of accuracy of transcript) are: 45.3, and 44.8 words per minute for Gregg and Century, respectively. These letter figures reflect the large proportion of students in both sections who scored below 50 wpm.

Number of Students Attaining Various Dictation Speeds (at 95% Accuracy) on One or More Tests.

Speed (wpm)	Gregg No. 90		Century 21 No. 90	
Below 50	18	69.3	23	65.7
50	2	7.7	0	0
60	3	11.5	4	11.4
70	1	3.8	5	14.3
80	2	7.7	3	8.6
Totals	26	100.0	35	100.0

An examination of the table listing the mean measures of various background variables gathered on the Gregg and Century 21 students reveals that the two populations are much the same. From a strict statistical viewpoint one could say there are no differences between the groups on these measures (at the $P<.05$ level or better). However, if one lowers the statistical level somewhat (to the $P<.10$ level or so) we find some differences, all favorable to the Century 21 group. For example, the Century 21 group measures more favorably on these measures (at $P<.10$ or nearly so):

Mother's Education
Expected GPA this semester
ACT Overall score
ACT English score
ACT Social Studies score

The Century 21 group also has slightly more favorable measures on the following variables:

Larger Hometown Population
Larger Family Income
Higher Education of Father
Age
English Usage (less Foreign Language Usage)
Shorthand Speed (High School)
Typing Speed
ACT Math
ACT Natural Sciences
Hours Studied per Week

In fact, the Century 21 group is slightly favored in most measures listed in this table. However, the Gregg group is favored in High School GPA, High School English GPA, Office Machines operated, and concurrent enrollment in a college English course. Each of these variables has been considered a good predictor of shorthand success in previous studies (as have all of the other variables mentioned). Our final conclusion about these background measures, then, is the two groups (Gregg and Century 21) are probably very similar with some slight advantage given to the Century group. Three of the five near-significant advantageous variables are ACT sub-test scores, some of which were used in the previous ANOVA calculations.

Turning now to the table listing mean performances on various attitude and shorthand performance variables we find somewhat the same pattern: No real differences between the two groups. In the shorthand performance measures the Century 21 group has a slight advantage in two measures (Theory and Final) while the Gregg group has a slight advantage in the other two (Dictation and Brief Forms). None of these measures are different at any level of statistical significance. It should be noted that the Century 21 group had over 200 speed forms to learn as compared to 133 Gregg brief forms.

Examining the mean ratings of the two groups on the career outlook measures, means of sub-tests of the Career Education Development Questionnaire (CEDQ) currently being developed at the NMSU Education Research Center, reveals that the Century 21 group scores higher in six of the fourteen sub-tests. The adjectives in the variable column of Table IV describe the high scorers in these sub-tests and may suggest a personality type. For the Century 21 group these adjectives would be:

Self-developer
Utilitarian
Preparator
Socializer
Rationalist
Independent

} Entrepreneur - Explorer Type

while for the Gregg group, who score higher on the remaining scales, they could be described as:

Procrastinator
Interactive
Planner
Risk-taker
Temporalist
Advancer
Socially aware
Regionalist

} Conservative - Stay at Home Type

Of course, these results are tentative, the differences indicated are not at or near any significant level; and the instrument used to categorize these groups has not been perfected. However, there seems to be some underlying difference between the make-up of the two groups, thus, perhaps indicating why the members chose one course in shorthand or the other. These personality differences between the groups may also obscure any differences in performance between the two groups. To help clarify how shorthand performance is related to the background and career education attitude measures, a factor analysis will be performed on the data gathered.

Factor Analysis

A factor analysis (an analysis of how variables cluster through an analysis of their mutual correlations and relationship between their covariances) was performed for the Gregg students and the Century 21 students separately. The 38 variables considered accounted for nearly 40% of the total variability among the measures when three factors were extracted. These three independent factors (for the Gregg students) were related to success on the ACT, success in shorthand, and success on the career education scales, respectively. These results seem to indicate the near independence of the three sets of measures. The

fourth set of measures (family background and High School experiences) were redistributed among one of the other three factors indicating, perhaps, some supportive role in these independent functions. For example: Home town population, Mother's Education, Lack of a Foreign Language, and the Planning-CEDQ sub-test are grouped with the five ACT sub-test scores indicating, perhaps, a supportive role in success on the ACT. On the other hand, Father's Education, English Course now, High School English GPA, and current semester GPA along with High School shorthand speed are grouped with the four shorthand performance measures indicating success in the shorthand course (Gregg).

Family Income, age, and typing speed are grouped with the rest of the Career Education Attitude measures in a third independent dimension indicating success in responding to the Career Education Description Questionnaire.

For the Gregg students at least, the supposed predictors of success (background, ACT, and CEDQ sub-tests) are apparantly independent (with some few exceptions) of performance tests in the shorthand course.

However, for Century 21 students, when we examine the results of the factor analysis of these variables along with the shorthand performance variables the CEDQ sub-scores are seen to divide up differently. The characteristics described previously as entrepreneural or enterprising are grouped with High School GPA, current semester GPA and age--indicating, perhaps, an independent factor describing college and high school success among the Century 21 students.

The variables: Home-town population, Father's and Mother's Education, and office machines operated (-) along with the four ACT test sub-scores and the three CEDQ scales (Rational, Independent, Regional all negatively weighted) indicate, perhaps, that a Home-bound orientation makes for ACT success.

The third factor (or rather the first) for the Century 21 group is much like the other factor in the Gregg group: High School GPA, English course now, and Shorthand WPM in High School are closely related to the four shorthand measures.

All of this discussion so far: the Analysis of Variance discussion, the t-test tables for the performance, attitude, and background variables and the factor analysis discussion just concluded, indicates that the Gregg and Century 21 groups <u>may</u> be quite different but the measures of the differences are not conclusive, in fact they are almost all borderline. However, there may be some personality differences between the Century 21 group and the Gregg group: risk takers versus stay-at-homes. A multiple regression analysis, wherein one attempts to predict success in the shorthand measures (Dictation, Theory, Brief Forms, and Overall) may show some interesting and practical relationships between these variables.

Regression Equations for Predicting Performance on the Four Shorthand Measures as a Function of Background and CEDQ Attitude Measures

Regression Equations were constructed using the 35 background, ACT and CEDQ attitude variables discussed previously as independent variables and the four measures of success in the shorthand courses. The influence of each of the independent variables as they enter the regression equation (increase in proportion of variability in the dependent variable = increase in R^2) is indicated in the following tables, (Tables V-VIII). Also, the final weighting of each variable in the final prediction equation is shown (Regression Coefficient). It is clear that if one considered only the first 18 to 20 or so of the regression terms that enter the equation, that the bulk of the explanatory power of the regression equation fit would be used up and the remaining 15 or so terms contribute only moderately to the predictive power of the equations (less than one percent for each of the later terms). This point is indicated by a line after step 19 in the first table (Dictation) and after steps 18, 21 and 20, respectively for the other three tables. The data for the later steps for the regression predictions for Theory, Brief Forms and Final average respectively has been left out of the table as reported. Their values are similar to those shown in the regression summary table for Dictation. These 20 or so terms in the regression equations predict a total of approximately 60% of the variability in the dependent measures. The remaining terms contribute perhaps another 10% of the remaining variability.

These regression summary tables allow us to examine the relative contribution of the various independent variables to prediction of the dependent (shorthand performance) variables. First, let us examine the relative importance of the variables considered in our previous analysis of variance discussion: Century 21 versus Gregg, Foreign Language or Not, ACT Math score, ACT Overall score.

Examining the regression data shows that the effect of Gregg or Century 21 enrollment contributes moderately to success predictions of all four shorthand variables. The average contribution to the final regression prediction is 1.87%, ranging from a low of 1.39 (for dictation) to a high of 2.58 (for Brief Forms). Moreover, enrollment in Century 21 rather than Gregg seems to have an inhibiting effect on success in these shorthand measures since the regression Coefficients are negatively weighted when Century 21 is entered as a 1 in the equations.

The effect of speaking a foreign language is also moderate in the regression equations. The language variable contributes an average of 1.28% to the final regression equations (a low of 0.86% for Theory and a high of 1.50% for Brief Forms). The direction of the contribution is positive, that is possessing and speaking a foreign language has a positive weighting. The net effect would be stronger for the foreign language speakers enrolled in Gregg than in Century 21 since the negative contribution due to Century 21 alone would be absent.

Table V

REGRESSION SUMMARY TABLE
DICTATION

STEP NO.		VARIABLE ENTERED (OR REMOVED)	MULTIPLE R	MULTIPLE R^2	INCREASE IN R^2	REGR. COEFF.
					Constant =	97.88799
1	5	High School GPA	.36	.130	.1302	5.133
2	4	Mother's Education	.49	.236	.1057	8.069
3	13	H.S. Shorthand (WPM)	.56	.311	.0749	0.208
4	29	Regional-CEDQ	.61	.370	.0593	- 7.271
5	17	Utilitarian-CEDQ	.63	.392	.0224	- 0.828
6	19	Procrastination-CEDQ	.64	.411	.0189	-11.323
7	26	Advancement-CEDQ	.65	.425	.0135	- 1.268
8	9	H.S. English GPA	.66	.439	.0144	- 5.775
9	12	Foreign Language	.67	.453	.0143	5.796
10	6	Gregg = 0, Century = 1	.68	.467	.0139	-17.169
11	3	Father's Education	.70	.491	.0238	- 5.153
12	11	Age	.71	.507	.0160	- 0.048
13	23	Socializing-CEDQ	.73	.527	.0202	- 0.086
14	35	Natural Sciences-ACT	.75	.556	.0287	- 4.435
15	21	Planning-CEDQ	.75	.565	.0086	-19.840
16	10	Semester GPA (Expected)	.76	.573	.0084	10.055
17	8	English Course Now	.77	.587	.0138	12.971
18	7	Hours Studied/week	.77	.597	.0104	- 0.726
19	15	Office Machines Oper.	.78	.611	.0134	-11.323
20	24	Temporal-CEDQ	.79	.618	.0078	- 2.800
21	34	Social Studies-ACT	.79	.624	.0059	- 2.894
22	18	Preparation-CEDQ	.80	.632	.0084	- 7.763
23	2	Parent's Income	.80	.648	.0152	3.226
24	(35)	Natural Sciences-ACT	.80	.648	-.0000	
25	27	Socially Aware-CEDQ	.81	.654	.0058	-11.133
26	1	Home Town Population	.81	.658	.0041	- 2.207
27	16	Self-Developer-CEDQ	.81	.661	.0035	9.361
28	22	Risk-taking-CEDQ	.82	.667	.0060	- 7.763
29	33	Math-ACT	.82	.670	.0031	- 4.580
30	28	Independence-CEDQ	.82	.672	.0023	8.215
31	32	English-ACT	.82	.673	.0007	- 4.477
32	31	Overall-ACT	.82	.674	.0006	16.851
33	35	Natural Sciences-ACT	.83	.688	.0146	- 4.435
34	(26)	Advancement-CEDQ	.83	.688	-.0000	
35	(11)	Age	.83	.688	-.0001	
36	20	Interactive-CEDQ	.83	.689	.0005	- 2.800
37	25	Rational-CEDQ	.83	.689	.0003	2.023
38	26	Advancement-CEDQ	.83	.689	.0002	- 1.268

◯ = Most Important Contributors.

Table VI

REGRESSION SUMMARY TABLE
THEORY

STEP NO.		VARIABLE ENTERED (OR REMOVED)	MULTIPLE R	MULTIPLE R^2	INCREASE IN R^2	REGR. COEFF.
					Const. =	41.95865
1	8	English Course Now	.39	.154	.1542	46.761
2	5	H.S. GPA	.51	.265	.1106	9.183
3	29	Regional-CEDQ	.57	.329	.0641	- 5.538
4	4	Mother's Education	.61	.374	.0447	11.533
5	13	H.S. Shorthand (WPM)	.63	.398	.0240	0.291
6	3	Father's Education	.65	.418	.0207	- 7.217
7	21	Planning-CEDQ	.66	.437	.0189	-41.228
8	19	Procrastination-CEDQ	.68	.459	.0221	-15.140
9	17	Utilitarian-CEDQ	.69	.476	.0167	-13.316
10	9	H.S. English GPA	.70	.494	.0181	-11.066
11	11	Age	.71	.509	.0152	0.499
12	26	Advancement-CEDQ	.72	.524	.0144	8.857
13	34	Social Studies-ACT	.73	.540	.0165	- 7.111
14	15	Office Machines Operated	.75	.557	.0166	3.511
15	6	Gregg or Century 21	.76	.574	.0168	-23.132
16	12	Foreign Language	.76	.582	.0086	4.705
17	28	Independence-CEDQ	.77	.591	.0094	27.766
18	27	Socially Aware-CEDQ	.78	.604	.0121	-29.164

○= Most Important Contributors.

Table VII

BRIEF FORMS

STEP NO.		VARIABLE ENTERED (OR REMOVED)	MULTIPLE R	MULTIPLE R^2	INCREASE IN R^2	REGR. COEFF.
					Const. =	-7.09459
1	8	English Course Now	.39	.156	.1557	41.673
2	32	English-ACT	.46	.216	.0598	- 6.385
3	1	Home Town Population	.51	.261	.0460	- 3.007
4	17	Utilitarian-CEDQ	.55	.306	.0447	-34.081
5	4	Mother's Education	.58	.334	.0281	14.161
6	5	H.S. GPA	.60	.355	.0210	10.175
7	3	Father's Education	.62	.382	.0271	- 8.744
8	9	H.S. English GPA	.63	.403	.0202	-12.684
9	21	Planning-CEDQ	.65	.416	.0135	-32.859
10	13	Socializing-CEDQ	.66	.430	.0139	0.402
11	19	Procrastination-CEDQ	.67	.449	.0187	- 8.140
12	6	Gregg or Century 21	.69	.475	.0258	-25.222
13	12	Foreign Language	.70	.490	.0150	11.066
14	16	Self-Developer-CEDQ	.71	.501	.0113	27.033
15	28	Independence-CEDQ	.72	.513	.0117	32.940
16	27	Socially Aware-CEDQ	.73	.530	.0178	-43.692
17	26	Advancement-CEDQ	.74	.544	.0138	22.887
18	33	Math-ACT	.75	.560	.0162	-10.765
19	31	Overall-ACT	.76	.583	.0222	31.130
20	(32)	English-ACT	.76	.583	-.0000	
21	24	Temporal-ACT	.77	.598	.0151	26.925

○= Most Important Contributors.

Table VIII

REGRESSION SUMMARY TABLE
FINAL AVERAGE

STEP NO.		VARIABLE ENTERED (OR REMOVED)	MULTIPLE R	MULTIPLE R^2	INCREASE IN R^2	REGR. COEFF.
					Const. =	47.49455
1	8	English Course Now	.35	.124	(.1237)	33.593
2	5	High School GPA	.47	.220	(.0962)	7.941
3	29	Regional-CEDQ	.53	.283	(.0635)	- 2.957
4	4	Mother's Education	.57	.326	(.0427)	11.190
5	3	Father's Education	.59	.353	(.0266)	- 6.956
6	13	H.S. Shorthand (WPM)	.61	.381	(.0278)	0.297
7	17	Utilitarian-CEDQ	.64	.408	(.0272)	-16.181
8	21	Planning-CEDQ	.65	.427	.0195	-31.090
9	19	Procrastination-CEDQ	.67	.444	.0163	-11.550
10	9	H.S. English GPA	.68	.458	.0140	-10.181
11	26	Advancement-CEDQ	.69	.477	.0195	10.300
12	11	Age	.70	.496	.0186	0.172
13	12	Foreign Language	.71	.509	.0133	7.233
14	34	Social Studies-ACT	.72	.523	.0141	- 5.374
15	6	Gregg or Century 21	.74	.541	.0181	-21.694
16	15	Office Machines Oper.	.75	.555	.0138	2.678
17	16	Self-Developer-CEDQ	.75	.565	.0096	18.293
18	33	Math-ACT	.76	.577	.0122	- 8.532
19	28	Independence-CEDQ	.77	.587	.0101	-11.550
20	27	Socially Aware-CEDQ	.78	.609	(.0221)	4.802

(○)= Most Important Contributors.

The effects of ACT Math performance and ACT Overall are low, both contributing (on the average) about 1% to the final regression equations. However, for some measures (e.g. Brief Forms) the contribution is moderate for both (1.62 and 2.22% contribution, respectively) and is among the top 20 contributors for final average. The direction of the weighting in the final equations is negative for ACT Math and positive for ACT Overall.

Thus, we again see that the effect of these variables is borderline at best and the direction of their effect is variable. Of course, these regression weightings are to be considered in conjunction with the other variables in the regression equations. They should not be considered alone. Some of these variables act as inhibiters to the regression equation while increasing the explanatory power of the equation. That is to say, their contribution is related to others already in the equation; and though they act negatively, they allow still others to make a larger contribution. All of the variables listed in the regression summary table contribute significantly ($P<.01$) to the overall equation, and the final equation is significant at this same level.

If we examine the regression equation summary tables to see which are the highest contributors to the final explanatory power (increase in R^2), we find consistencies emerging across the four regression equations. If we take as our standard of importance those variables which contribute 2% or more to the final R^2 predictive power (items circled) we find that:

High school GPA, Mother's Education, Father's Education, are consistently among the important contributors, while English course now, high school shorthand WPM, Utilitarian CEDQ, and Regional CEDQ are among the important contributors in three out of four of the equations. Other important contributors are Socializing CEDQ, Procrastinating CEDQ, Natural Science ACT, English ACT, Home town population, high school English GPA and Gregg versus Century 21. The latter set of high contributors generally are of high importance in only one of the regression equations.

In summary, then, the consistently important contributors to prediction of success in the four shorthand measures are: high school GPA, Mother's and Father's Education, English course now, previous shorthand experience in high school and two of the CEDQ scales: Utilitarian and Regional (both weighted negatively). The last two variables (when positive) are part of the Entrepreneur-Explorer personality type; when negative they may be part of the conservative-stay-at-home type discussed previously. The regression equations have not indicated the clear usefulness of shorthand type, ACT measures, or foreign language spoken as predictors of success in shorthand. Rather, the usual social status measures and previous experience in shorthand do have high predictive power.

No regression equations have been computed for each shorthand type separately. Because of the large number of variables as candidates for prediction (all but a few are significant in the prediction) and the small sample for both Century 21 (35) and Gregg (26) the possibility of getting useful prediction equations with many variables is remote. However, if we can restrict ourselves to ten or so prediction variables, then regression equations to predict shorthand performance for Gregg and also for Century 21 are possible. We can do this in a later analysis.

APPENDICES

Research Design Proposal

Questionnaires

A Proposal for Statistical Evaluation of the Project:

Pilot Courses in Century 21 Shorthand

in the

DACOEB Secretarial Administration Program

Project Proposal # NMSU-76-00064

Eleanor A. Heins, Project Director

August 28, 1975

Submitted by

Theodore G. Brough
Consultant

Western Research and Evaluation Center
Drawer 3BI University Park Branch
Las Cruces, New Mexico 88003
Phone (505) 523-0654

The consultant (Theodore G. Brough) will act as project statistical consultant during the two-year period of the experimental project, performing suitable analyses and submitting statistical reports at appropriate times (at the end of each semester).

The project is expected to supply clerical assistance where necessary for the preparation of multiple copies of questionnaires and information gathering instruments. In addition, computer time is expected to be made available by the project. It is expected that the computer time necessary should not exceed $100 per semester. Appropriate questionnaires and other testing instruments (in single copies) and any resulting IBM cards will be prepared by the consultant.

Reasonable access to student records (class records and University files) will be necessary during the 2-year period. Most of the information can be gathered from questionnaires supplied by the consultant or from classroom records. A few, such as ACT test scores or previous grades, may have to come from the permanent records.

The experimental design for the analysis is outlined on the following pages. The approach is 1) A controlled variable experiment (3-way Analysis of Variance) using various measures of student performance, and 2) A post-hoc analysis using multiple regression analysis. The latter approach is an attempt to find significant contributors to student performance from a many variable prediction equation.

Experimental Design: 3-Way Analysis of Variance on each Performance Measure

For each semester for both sections, the following measures will be gathered on each student:

Dependent Variables

1. Four measures of performance on Speed Forms
2. Four measures of performance on Theory
3. Four Measures of Dictation: 50, 60, 70, 80 words/min. (Standard: 3 min. with 95% accuracy). Error count at each speed.
4. Average (Performance)

Independent Variables

ACT scores (High vs. Low)

3-Way ANOVA Ethnicity (Anglos vs. Others) (About 30 students in each category)

Shorthand Class Enrollment (Two sections) (About 30 students in each class)

Post hoc Analyses (to be done at the end of each semester) Multiple Regression Analyses

A multiple regression analysis designed to demonstrate performance as a function of many variables will be performed.

Dependent Variables (Performance Variables)

Variables listed above

Grade Achievement

Pop Quiz average

Multiple Regression (Cont.)

Independent Variables (Performance as a function of these)

Outside hours spent in preparation

Career Education background questions and subscores

Type of Shorthand Class enrolled in

Age

Current Enrollment in English Class

English Grade Achieved

High School Grade Point Average

College Grade Point Average

ACT scores

Ethnicity

Other Statistics

Performance

Drop out rate as a function of: ACT, Ethicity, Shorthand Type:
Performance Measures:
Speed, Theory, Dictation

Other comparisons using grouped statistics (t-tests) as appropriate.

PILOT COURSES IN CENTURY 21 SHORTHAND

BACKGROUND INFORMATION
QUESTIONNAIRE

Name: _____ Age: _____

Permanent Address: Sex:

Street: _____ F _____

City, State: _____ M _____

ZIP Code: _____

Telephone: _____

School Address:

Street: _____

City, State: _____

ZIP Code: _____

Telephone: _____

ACT Scores: _____

Language Spoken at Home: (Check Only One)

English Only: _____

English and Other: _____

Other Most of the time: _____ What Language does Other Refer to? Please State: _____

Programs enrolled under:

Handicapped: _____

Disadvantaged: _____

Vocational Rehabilitation: _____

SER: _____ HELP: _____

WIN: _____ JUNTOS: _____

SETA: _____ VETERANS: _____

University Programs:

Work-Study: _____

Grants: _____

Scholarships (Give Source): _____

COPE: _____

Other (Give Name): _____

HIGH SCHOOL

Name: _____

Street Address: _____

City, State: _____

ZIP Code: _____ Date of Graduation: _____

Program Followed:

College Prep. _____

Business _____

Other _____

Shorthand Completed: _____ semesters

Shorthand Speed Achieved: _____ wpm for _____ minutes.

Percentage of Errors: _____

Typing Completed, Semesters: _____

Typing Speed Achieved: _____ wpm for _____ minutes.

Number of Errors per minute: _____

Filing Courses Completed: _____

Machines Operated, Name: _____

_____

_____

_____

_____

Career Education Description Questionnaire

This questionnaire describes some of the topics associated with a persons' choice of a career. Each person has different experiences, attitudes and views on topics related to career education. Accordingly, there are no "right" or "wrong" answers in the questionnaire, but instead statements which simply describe a variety of topics associated with career education. Please read each statement carefully and then, using the scale printed at the top of each page, indicate your response to the item.

If you are not sure about the question, you may omit answering it, or make the best possible estimate of how you feel about it. If any of the questions are objectionable to you, simply do not answer them. However, your responses to this questionnaire will be held in confidence, and no individual information will be made available to the public.

The project is supported by a grant from the Bureau of Vocational Research, U.S. Office of Education, Washington, D. C. The purpose of the project is to provide basic research data for improving the career choices of students.

THANK YOU

Vocational Research Project

Education Research Center

New Mexico State University

1975

Career Education Description Questionnaire

C1-4. Name _____

C5-10. If you are in a special program at the University, please write in name of the program e.g. COPE, SSS, etc. _____

BIOGRAPHICAL INFORMATION

C11. Sex
1. Male
2. Female

C12. Age
1. 18 or younger
2. 19-21
3. 22-25
4. 26-29
5. 30 or older

C13. Marital status
1. Single
2. Engaged
3. Married, no children
4. Married, with children
5. Widowed, divorced or separated

C14. Ethnicity
1. White-American
2. Spanish-American
3. Black-American
4. Native-American
5. Other (Please Specify)

_____

C15. Education
1. Pre-college
2. Freshman
3. Sophomore
4. Junior
5. Senior
6. Graduate

C16. Population of your "home town"
1. 2,500 or less
2. 2,501 to 10,000
3. 10,001 to 50,000
4. 50,001 to 100,000
5. 100,001 to 500,000
6. 500,001 or more

C17. Years lived in present community
1. One year or less
2. 2 - 4
3. 5 - 10
4. 11 - 19
5. 20 or more years

C18. Church attendance for the past year
1. Never
2. A few times
3. Once a month
4. 2 or 3 times a month
5. Once a week
6. Weekly or more

C19. Your parents yearly family income
0. Don't know
1. $3,000 or less
2. 3,001 to 5,000
3. 5,001 to 10,000
4. 10,001 to 20,000
5. Over $20,000

C20. Your yearly income, include wife if married
0. Don't know
1. $3000 or less
2. 3,001 to 5,000
3. 5,001 to 10,000
4. 10,001 to 20,000
5. Over 20,000

C21. Father's Education
1. Less than 7 years school
2. Jr. High School graduate
3. Attended high school
4. High School graduate
5. Attended college or post high school
6. College graduate
7. Attended graduate school
8. Masters degree
9. Doctors degree

C22. Mother's Education
1. Less than 7 years school
2. Jr. High school graduate
3. Attended high school
4. High School graduate
5. Attended college or post high school
6. College graduate
7. Attended graduate school
8. Masters degree
9. Doctors degree

C23. Military Service
1. Non-veteran
2. Reserve or National Guard only
3. Veteran of active duty
4. Other (Please specify)

_____

C24. Father's attitude toward your attending college
1. Don't know
2. Opposed to my attending
3. Mixed feelings about attendance
4. Said "it was up to me"
5. Actively urged me to attend
6. Took it for granted I would attend

C25. Mother's attitude toward your attending college
1. Don't know
2. Opposed to my attending
3. Mixed feelings about attendance
4. Said "it was up to me"
5. Actively urged me to attend
6. Took it for granted I would attend

C26. What was your approximate grade point average in high school (A = 4.00)
1. .5 or less
2. .5 - 1.4
3. 1.5 - 2.4
4. 2.5 - 3.4
5. 3.5 - 4.0

III

1. Strongly disagree
2. Disagree
3. Agree
4. Strongly agree

VIEW OF EDUCATION

27.	Usually, I learn more on my own than I do from the instructor	1	2	3	4
28.	I would like to take only the classes I need for graduation	1	2	3	4
29.	Many required courses have little relevance to me	1	2	3	4
30.	I like classes that teach something practical	1	2	3	4
31.	I accept the idea of "knowledge for knowledge's sake"	1	2	3	4
32.	All cultural groups have the same opportunity for an education	1	2	3	4
33.	One doesn't need a college degree to get a good job	1	2	3	4
34.	The more education one obtains the more they find out how little they know	1	2	3	4
35.	College helps one learn about the cultural values of others	1	2	3	4
36.	My parents always expected me to go to college	1	2	3	4
37.	Education helps develop one's philosophy of life	1	2	3	4
38.	Instructors provide individual assistance to students	1	2	3	4
39.	College helps one find friends with other cultural backgrounds	1	2	3	4
40.	Learned very much in high school	1	2	3	4
41.	Instructors are receptive to change	1	2	3	4
42.	A degree is only a "ticket" to a good job	1	2	3	4
43.	Jobs are open to persons from all cultural groups	1	2	3	4
44.	I have learned much in my college courses	1	2	3	4
45.	College is an excellent place to find new friends	1	2	3	4
46.	I have wanted to attend college for a long time	1	2	3	4

IV

1. Strongly Disagree
2. Disagree
3. Agree
4. Strongly agree

STUDY PRACTICES

47.	I work hard to get good grades even if I don't like a course	1	2	3	4
48.	I have a definite career selected after college	1	2	3	4
49.	I put off doing homework until the last minute	1	2	3	4
50.	I can study at least one hour without being distracted	1	2	3	4
51.	During an exam I have difficulty remembering things I know	1	2	3	4
52.	I am interested in most of my classes	1	2	3	4
53.	I worry about flunking out of college	1	2	3	4
54.	I usually study in the same place	1	2	3	4
55.	Obtain help from someone if I don't understand	1	2	3	4
56.	Use a dictionary to find the meaning of words I don't know	1	2	3	4
57.	Read assignments prior to attending class	1	2	3	4
58.	Review class materials several days before the exam	1	2	3	4
59.	Allow time for relaxation and recreation	1	2	3	4
60.	Can easily express myself orally	1	2	3	4
61.	Can easily express my thoughts in writing	1	2	3	4
62.	Try and anticipate what the instructor will ask on an exam	1	2	3	4
63.	My mind wanders when I try to study	1	2	3	4
64.	Cram the night before an exam	1	2	3	4
65.	Homework has first priority over most things	1	2	3	4
66.	Perform at my best during an examination	1	2	3	4
67.	Do my homework on a regular basis	1	2	3	4
68.	Participate actively in class discussions	1	2	3	4
69.	Go out at night with others during the school week	1	2	3	4
70.	I need to improve my study habits	1	2	3	4

1. Strongly disagree
2. Disagree
3. Agree
4. Strongly agree

SELF CONCEPT

71.	It is important for me to get ahead	1	2	3	4
72.	I get along with most people	1	2	3	4
73.	I have accomplished many difficult things	1	2	3	4
74.	I try hard to get good grades	1	2	3	4
C11.	I have much to be proud of	1	2	3	4
12.	Having many friends is important to me	1	2	3	4
13.	I've had few opportunities to demonstrate what I really can do	1	2	3	4
14.	Success is just, "getting up one more time"	1	2	3	4
15.	I usually plan ahead for things	1	2	3	4
16.	I invent new ways to do things	1	2	3	4
17.	I often act completely on impulse	1	2	3	4
18.	It is easy for me to become apathetic and not try things	1	2	3	4
19.	I often do what my friends want to do	1	2	3	4
20.	I am seldom caught unaware	1	2	3	4
21.	Seldom have enough time to finish all I want to do	1	2	3	4
22.	Am always trying new things	1	2	3	4
23.	Often see the humor in tense situations	1	2	3	4
24.	Usually meet deadlines imposed on me	1	2	3	4
25.	Usually respond aggressively in competitive situations	1	2	3	4
26.	I do many things for others	1	2	3	4
27.	I like to know "the rules of the game" before committing myself	1	2	3	4
28.	I usually avoid ambiguous situations	1	2	3	4
29.	Rules are made to be followed	1	2	3	4
30.	I perform best in a tense situation	1	2	3	4

VI

1. Strongly disagree
2. Disagree
3. Agree
4. Strongly agree

PHILOSOPHY ABOUT LIFE

31.	Maintaining the rules of a society is more important than the rights of a single individual	1	2	3	4
32.	An individual to a large degree can control his own destiny	1	2	3	4
33.	There is no final authority concerning moral values	1	2	3	4
34.	Seeking personal happiness is an acceptable end in itself	1	2	3	4
35.	Ideas have value only if they can be put to use	1	2	3	4
36.	Knowledge is open-ended and tentative rather than certain	1	2	3	4
37.	All authority should be open to examination	1	2	3	4
38.	Personal experience is the best basis for making decisions	1	2	3	4
39.	Moral values should change with the times	1	2	3	4
40.	Science provides the best way of explaining the universe	1	2	3	4
41.	Truth is obtainable through the human powers of the intellect	1	2	3	4
42.	A person can never fully experience the feelings of another person	1	2	3	4
43.	Thorough knowledge of the past is a good preparation for the future	1	2	3	4
44.	The world is always in a state of change	1	2	3	4
45.	Technology has made the world a better place to live	1	2	3	4
46.	Most people resist changes in our society	1	2	3	4
47.	An individual should be responsible only to himself for his actions	1	2	3	4
48.	It is immature to believe in something only because ones parents did	1	2	3	4
49.	The universe operates upon discoverable natural laws	1	2	3	4
50.	One gets ahead in society by being truthful	1	2	3	4
51.	There is usually only one "best" answer to a problem	1	2	3	4

VII

1. Very unimportant
2. Unimportant
3. Important
4. Very important

ATTRIBUTES OF A CAREER

52.	Being "on the road" much of the time	1	2	3	4
53.	Remain near friends	1	2	3	4
54.	Able to work when you want	1	2	3	4
55.	Earn considerable money	1	2	3	4
56.	Engage in creative activities	1	2	3	4
57.	Social status and prestige	1	2	3	4
58.	Remain near parents or family	1	2	3	4
59.	Act in a leadership position	1	2	3	4
60.	Have specified and routine activities to perform	1	2	3	4
61.	Work with people rather than things	1	2	3	4
62.	Have a stable and secure future	1	2	3	4
63.	Relatively free from supervision	1	2	3	4
64.	In a position to help others	1	2	3	4
65.	Be your own "boss"	1	2	3	4
66.	Have regular working hours	1	2	3	4
67.	Live in different regions of the country	1	2	3	4
68.	Regular time-in-grade promotions	1	2	3	4
69.	Remain in hometown area	1	2	3	4
70.	In a position to help others from my cultural group	1	2	3	4
71.	Based upon your formal education	1	2	3	4
72.	Opportunity for rapid advancement	1	2	3	4
73.	Obtain enjoyment from my job	1	2	3	4
74.	Work with persons from other cultures	1	2	3	4

CAREER EDUCATION DESCRIPTION QUESTIONNAIRE

VIEW OF EDUCATION

SELF-DEVELOPER:	35, 36, 37, 38, 39, 43, 44, 45, 46
UTILITARIAN:	27, 28, 29, 30, 33, 25* (FROM SELF-CONCEPT SCALE)

STUDY PRACTICES

PREPARATION (SYSTEMATIZER):	47, 56, 57, 58, 65, 66, 67
PROCRASTINATION:	49, 51, 53, 63, 64, 70
INTERACTIVE:	48, 55, 60, 61, 62, 68

SELF-CONCEPT

RISK-TAKING:	13*, 16, 21, 22, 23, 30
PLANNING:	71, 73, 74, 15, 20, 29
SOCIALIZING:	12, 17, 18, 19, 26, 27

PHILOSOPHY OF LIFE

TEMPORAL:	33, 34, 35, 36, 37, 38, 39, 47
RATIONAL:	31, 40, 41, 45, 49, 50

CAREER ATTRIBUTES

ADVANCEMENT:	55, 57, 60, 62, 66, 68, 71, 72
SOCIALLY AWARE:	56, 61, 64, 73, 74
INDEPENDENCE:	52, 63, 65, 67
REGIONAL:	53, 54, 58, 69

*Notice that the numbers repeat. This is because these numbers refer to the column on the data cards of the SBDQ and there are two data cards. See the SBDQ Questionnaire for clarification.

PILOT COURSE IN CENTURY 21 SHORTHAND

BACKGROUND AND STUDY HABITS INFORMATION

Name _____

Social Security Number _____

How many hours per week do you spend in preparing for this course, outside of class?

_____

Are you currently enrolled in one or more English courses?

Yes _____ No _____

First English Course: Class Name _____

Class No. _____ Expected Grade _____

Other English Course: Class Name _____

Class No. _____ Expected Grade _____

If you are not currently enrolled in an English course, what grade did you receive in your last English course in college?

Grade _____ Name of Course _____

Even if you are currently enrolled in an English course, what grade did you receive in your last English class in high school?

Grade _____ Name of course _____

What is your current Grade Point Average in college? _____
(A = 4.0, B = 3.0, C = 2.0)

What is your expected Grade Point Average for this semester? _____
(A = 4.0, B = 3.0, C = 2.0)

What kind of reading instruction did you have in grammar school?

_____ Phonics _____ Look-Say _____ Other

Can you remember the name of your reading series?

Please name _____

Publisher (Ginn, Elson, etc.) _____